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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,604	03/31/2004	Sean S. B. Moore	CETACEAN-002XX	5460
207 7590 06/02/2008 WEINGARTEN, SCHURGIN, GAGNEBIN & LEOVICI LLP TEN POST OFFICE SQUARE BOSTON, MA 02109			EXAMINER KAWSAR, ABDULLAH AL	
			ART UNIT 2195	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/814,604	Applicant(s) MOORE, SEAN S. B.	
	Examiner KWOK W. LEE	Art Unit 2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-46 is/are rejected.
- 7) ☒ Claim(s) 10, 11, 16, 24-26, 29, 35-37, 39 and 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/27/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-46 are pending in this application.

Information Disclosure Statement

2. The information disclosure statement filed 9/27/2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication (JB Fraleigh, A First Course in Abstract Algebra) or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Objections

3. Claims 10, 11, 16, 24-26, 29, 35-37, 39 and 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 22-28 and 45 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

6. As per claims 22-28 and 45, they're rejected under 35 U.S.C. 101 because the claimed invention are directed to apparatus claims, but appearing to be comprised of software alone without claiming associated computer hardware required for execution. For example, claim 22 recited a plurality of tasks, a resource (although resources can be hardware, there is nothing in the claim that would suggest so and is instead construed to be software) and a scheduler, are all software modules/functions. Software alone is directed to a non-statutory subject matter.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A. The following terms lack antecedent basis:

(i) the set of tasks – claim 1, line 3.

(ii) the group – claim 1, line 8.

(iii) the set of subgroup generators – claims 15 and 16.

(iv) mathematical group – claim 22.

(v) the resource schedule period – claim 44.

B. The following claim language is unclear and indefinite:

(i) As per claims 1, 22, 31-33 and 44-46, it is unclear as to what the exact definition of a coset is and how a coset is determined. The relationship between the task as a coset in relation to being part of a subgroup of a resource cannot be determined. There is no explanation of the mathematics involved in defining the coset and the subgroups.

(ii) Further as per claim 1, it is unclear as to how a resource be defined as a mathematical group. How does a unit of measure for a resource be defined as to assigning an order or size to a group? Does the order relate to the scheduling and the size relating to task size?

(iii) As per claims 3, 6, 10-12, 15-16, 18, 23-26 and 29-30, it is unclear as to what is a generator and has to be further explained. Does the generator generate tasks or resources?

(iv) As per claim 5, it is unclear as to how the plurality of resources are distributed throughout a physical domain. Does this mean that a person would be able to see these resources and that they would be tangible?

(v) As per claims 1, 8, 10, 13, 19, 24, 35, 38 and 43, it is unclear as to what is meant by two different orders. Is order being defined in relation to priority or magnitude?

(vi) As per claim 9, it is unclear as to what a task appointment is and how this value is calculated.

(vii) As per claims 10, 24 and 35, it is unclear as to what the N , Z_n and 2^j values are suppose to represent. These values should be well-defined and their relationships should be clearly mapped out.

(viii) As per claims 11, 25, 29 and 36, it is unclear as to what are the values for x and y (i.e. integers, less than or greater to 0). Further, it is also unspecified as to what is a coset representative.

(ix) As per claims 12, 26, 30 and 37, it is unclear as to what the values of P correspond to and where do these selected numbers come from.

(x) As per claims 18-19, 41-43 it is indefinite as to the value of a greatest common divisor that is relatively large.

(xi) As per claim 30, it is indefinite as to the value of g , where the greatest common divisor of the elements in P is being compared to.

9. Claims 1-46 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are:

determining a value for N representing a schedule period or appointments;
factoring the value of N to generate isochronous flow rates;
calculating a interpacket spacing value by dividing N over the isochronous flow rates, giving a period measured in appointments; and

using the interpacket spacing value to create a subgroup representing an isochronous flow.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-9, 13-15, 17-23, 27-28, 31-34, 38, 40-41 and 44-46 are rejected under 35 U.S.C. 102(b) as being anticipated by Alfieri (US 5,745,778).

12. As per claim 1, Alfieri teaches the invention as claimed including a method for modeling and structuring a scheduling system, said system including a plurality of tasks (See figure 2, threads 212-214, 222-223, and 232-233) a resource for servicing the tasks (See figure 1, CPU's 100-107), and a scheduler that assigns the set of tasks to the resource (Column 3, line 63-column 4, line 7), said method comprising the act of defining tasks as cosets of subgroups of a mathematical group (See figure 2, thread group 210, threads in a thread group defined as a coset belonging to a subgroup of CPU's 100-103 in figure 1), defining a resource as said mathematical group (See figure 1, CPU's 100-107), and defining a unit of measure for the resource in such a way as to

assign an order, or size, to the group (Column 3, lines 56-60, where a timeslice is the unit of measure).

13. As per claim 2, Alfieri teaches the invention as claimed including in which the cosets representing tasks, the groups representing resources, and units of measure are defined over any physical domain, including but not limited to time, space, frequency, energy, speed, and mass (Column 3, lines 56-60).

14. As per claim 3, Alfieri teaches the invention as claimed including wherein said system includes at least a first task represented by a coset (See figure 2, thread group 210) and associated subgroup (See figure 1, CPU's 100-103) and at least a second task represented by a second coset (See figure 2, thread group 220) and associated subgroup (See figure 1, CPU's 104-107) in which the generator of the second subgroup is different from the generator of said first subgroup (Column 4, lines 62-64, where the generator is a CPU).

15. As per claim 4, Alfieri teaches the invention as claimed including wherein said scheduling system includes a plurality of resources (See figure 1, CPU's 100-107).

16. As per claim 5, Alfieri teaches the invention as claimed including wherein said plurality of resources are distributed throughout a physical domain (Column 3, lines 56-60).

17. As per claims 6 and 23, Alfieri teaches the invention as claimed including wherein a task can be represented by a coset of a subgroup of the group representing a resource (See figure 2, thread group 210, threads in a thread group defined as a coset belonging to a subgroup of CPU's 100-103 in figure 1), and the coset can be fully represented by first and second values in which the first value includes a generator of the subgroup (See figure 1, level 0 and column 4, lines 62-64) and the second value includes a coset representative (See figure 2, thread group structure 211, showing priority value of 900).

18. As per claim 7, Alfieri teaches the invention as claimed including wherein a task can be represented by contiguous cosets of a group (See figure 2, where process 200 is the task represented by contiguous cosets of thread groups 210, 220 and 230).

19. As per claim 8, Alfieri teaches the invention as claimed including wherein said plurality of resources are represented by groups with at least two different orders (Column 4, lines 62-64, where the orders correlate to the different tasks assigned to each CPU or CPU group commanded by priority).

20. As per claim 9, Alfieri teaches the invention as claimed including wherein said system includes a packet switching communications system having periodic scheduled task appointments (Column 3, lines 1-4).

21. As per claim 13, Alfieri teaches the invention as claimed including wherein said system includes a plurality of resources, said plurality of resources represented by groups with at least two different orders (Column 4, lines 62-64, where the orders correlate to the different tasks assigned to each CPU or CPU group commanded by priority).

22. As per claim 14, Alfieri teaches the invention as claimed including wherein said mathematical group is selected from a set of groups consisting of abelian mathematical groups (See figure 2, thread group 210) and non-abelian mathematical groups (See figure 2, where thread 232 is a subgroup of thread group 230, defining it as non-abelian according to applicant's specification paragraph [0013]).

23. As per claim 15, Alfieri teaches the invention as claimed including wherein the set of subgroup generators is restricted to a subset that is smaller than said set of subgroup generators (Column 4, lines 57-59, CPU's 100-101 is a subset that is restricted to be smaller than that of subgroup generators 100-103).

24. As per claims 17 and 40, Alfieri teaches the invention as claimed including in which the groups representing resources are chosen such that the intersection of cosets

representing tasks will be null (Column 4, lines 62-64, where there are no intersecting of threads to processors).

25. As per claims 18 and 41, Alfieri teaches the invention as claimed including in which the unit of measure for a resource is chosen such that the set of generator values (Column 5, lines 14-21, generator value being the priority) of all of the subgroups of the group representing said resource (See figure 1, CPU's 100-107) are not pairwise relatively prime or is chosen such that the said set of generator values has a greatest common divisor that is relatively large (0 and 7167 are not relatively prime).

26. As per claim 19, Alfieri teaches the invention as claimed including in which the unit of measure is chosen such that the corresponding set of orders of the groups representing said plurality of resources has a greatest common divisor that is relatively large (Column 5, lines 14-21 and Column 5, lines 30-35, where in the case for demons of priority 1800 and up, the greatest common divisor of values 1800 and 3600, the up value being 3600, is 1800; and 1800 is relatively large).

27. As per claim 20, Alfieri teaches the invention as claimed including the act of encoding system state information using group, subgroup, or coset notations (As defined by applicant's specification in paragraph [0035], the coset can be fully represented by first and second values in which the first value includes a generator of the subgroup <See figure 1, level 0 and column 4, lines 62-64> and the second value

includes a coset representative <See figure 2, thread group structure 211, showing priority value of 900>).

28. As per claim 21, Alfieri teaches the invention as claimed including wherein said scheduler identifies possible collision events, or equivalently the elements of a non-null intersection of cosets that represent tasks, before such possible events occur (Column 5, lines 4-10, showing threads from a thread group are scheduled and identified for intersected running on any CPU or CPU group).

29. As per claim 22, Alfieri teaches the invention as claimed including a scheduling system having a plurality of tasks (See figure 2, threads 212-214, 222-223, and 232-233), a resource for servicing the tasks (See figure 1, CPU's 100-107), and a scheduler (Column 3, line 63-column 4, line 7) that identifies the plurality of tasks with cosets of subgroups of a group representing said resource (See figure 2, thread group 210, threads in a thread group defined as a coset belonging to a subgroup of CPU's 100-103 in figure 1), where said group is chosen by defining one or more units of measure for the resource in such a way as to index the resource by the elements of said mathematical group (Column 3, lines 56-60, where a timeslice is the unit of measure).

30. As per claims 27-28, they're scheduler and scheduling system claims of claim 1; therefore, they're rejected for the same reason as claim 1.

31. As per claims 31 and 32, Alfieri teaches the invention as claimed including a method for synthesizing/decomposing a task, represented by a coset (See figure 2, thread group 210) and associated subgroup (See figure 1, CPU's 100-101), from a plurality of tasks represented by cosets (See figure 2, thread groups 220 and 230) with subgroups different from the subgroup representing said task (See figure 1, CPU's 102-103 and 104-107).

32. As per claims 33 and 44-46, Alfieri teaches the invention as claimed including a method for modeling and structuring a scheduling system operating in the time domain, said system including a plurality of periodic tasks (See figure 2, threads 212-214, 222-223, and 232-233), a resource for servicing the tasks (See figure 1, CPU's 100-107), and a schedule period associated with the resource (Column 3, lines 53-63), and a scheduler that assigns the set of tasks to the resource (Column 3, line 63-column 4, line 7), said method comprising the act of defining and measuring task periods and said resource schedule period by one or more units of measure in such a way that measurement values for the task periods and the resource schedule period are indexed by elements of a mathematical group (Column 3, lines 56-60, timeslice in relation to CPU).

33. As per claim 34, Alfieri teaches the invention as claimed including wherein said system includes at least a first periodic task having a first period and at least a second

periodic task having a second period different from said first period (Column 3, line 53-
column 4, line 7).

34. As per claim 38, Alfieri teaches the invention as claimed including wherein said system includes a plurality of resources, said plurality of resources represented by groups Z.sub.N (See figure 1, CPU's 100-107) with at least two different values of N, or equivalently with at least two different orders for said groups (Column 4, lines 62-64, where the orders correlate to the different tasks assigned to each CPU or CPU group commanded by priority).

Claim Rejections - 35 USC § 103

35. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

36. Claims 12, 30 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alfieri (US 5,745,778).

37. As per claim 12, Alfieri substantially teaches wherein said system supports tasks represented by subgroups with generator values selected from $P = \{p_{\text{sub.1}}, p_{\text{sub.2}}, \dots, p_{\text{sub.k}}\}$ (Column 5, lines 14-21, where P is a group of numbers ranging from 0-7167)

and further including the act of uniquely assigning coset representatives to the tasks , where said coset representatives (See figure 2, thread group structure 211, showing priority value of 900) are selected from the set of values $\{0, 1, \dots, g-1\}$ (Column 5, lines 22-35), where $g=\gcd(P)$, the greatest common divisor of all of the element values in P (Column 5, lines 30-35, where in the case for demons of priority 1800 and up, the greatest common divisor of P values 1800 and 3600, the up value being 3600, is 1800; therefore the 900 selected is well within the set of values from 0-1799).

38. As per claim 30, Alfieri substantially teaches wherein said system supports tasks with coset representatives (See figure 2, thread group structure 211, showing priority value of 900) uniquely selected from a set of values $\{0, 1, \dots, g-1\}$, and further including the act of assigning subgroups to the tasks, wherein subgroup generator values are chosen from the set $P=\{p.\text{sub}.1, p.\text{sub}.2, \dots, p.\text{sub}.k\}$ (Column 5, lines 14-21, where P is a group of numbers ranging from 0-7167), and further including the act of selecting the elements in P such that $\gcd(P)$, the greatest common divisor of the elements in P , is greater than or equal to g (Column 5, lines 30-35, where in the case for demons of priority 1800 and up, the greatest common divisor of P values 1800 and 3600, the up value being 3600, is 1800; where the P values are greater than or equal to 1800).

39. As per claim 43, Alfieri substantially teaches in which the unit of measure is chosen such that the corresponding set of orders of the groups representing said plurality of resources has a greatest common divisor that is relatively large (Column 5,

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lines 14-21 and Column 5, lines 30-35, orders of the groups are represented by priority levels where in the case for demons, of priority 1800 and up, the greatest common divisor of values 1800 and 3600, the up value being 3600, is 1800; and 1800 is relatively large).

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Wisler et al reference shows calculating and performing all the steps prior to defining tasks as cosets with regards to data flow.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KWOK W. LEE whose telephone number is (571)270-3557. The examiner can normally be reached on Mon - Thu and alternate Fridays 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. W. L./
Examiner, Art Unit 2195

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